CLAIMS

1. Method of fabrication of multiplexing and demultiplexing single-mode fiber optic couplers which comprises:

(a) aligning two single-mode fibers, which have been stripped of their protective plastic jackets and cleaned, so that they are held in contact with each other;

(b) fusing said fibers in a fusing zone, using a suitable heat source to achieve a predetermined fusion profile; and

(c) elongating the fused fibers by controllably pulling them longitudinally while heating them with a suitable heat source so as to create a coupling zone with an adiabatic profile, and stopping the elongation process when a match point between wavelength period and polarization phase is achieved, thereby producing the desired multiplexing or demultiplexing coupler.

2. Method according to claim 1, further comprising interrupting and resuming the elongation of the fused fibers, while monitoring the wavelength response during each interruption, so as to achieve a precise match point between the wavelength period and the polarization phase.

3. Method according to claim 2, wherein the interruption is done by removing the heat source, stopping the pulling of the fused fibers and measuring the evolution of the wavelength period at that point and then reheating and re-pulling the fibers until a desired wavelength response is obtained.

4. Method according to claim 3, wherein when the wavelength period is close to the desired target, very short re-heating periods and pulls are made to produce the

precise wavelength response required to achieve the polarization phase match point. which may be any point in a series of match points, depending on the desired length of the coupler.

5. Method according to claim 4, wherein, if the polarization phase match point is slightly overshot, it is brought back by a final cold pull, without re-heating the fibers.

Subd 1

6. Method according to any one of claims 1 to 5, which comprises aligning of the two fibers in parallel alignment without crossing or twisting said fibers with each other.

7. Method according to claim 6, wherein the parallel alignment of the fibers is achieved by providing a mechanical aligning slot in fiber positioning devices at each end of the fusing zone.

Subd 2

8. Method according to any one of claims 1 to 7, wherein the fibers are fused using a heat source which is hotter than the heat source used for elongation.

9. Method according to any one of claims 1 to 8, wherein by adjusting the degree of fusion between the fibers, a desired shift in the polarization match point is produced.

10. Method according to claim 9, wherein by realizing the fusion with a large flame, the fusion slopes are reduced to achieve an adiabatic, lossless fusion.

11. Method according to claim 9, wherein by brushing the fibers with a fusion flame, the fusion slopes are reduced to achieve an adiabatic, lossless fusion.

Subd 3

12. Method according to claim 9, 10 or 11, wherein by reducing the degree of fusion, a larger polarization match point spacing is realized.

13. Method according to any one of claims 1 to 12 wherein, when elongating the fused fibers, the heating is carried out by a flame on a torch which can be brushed

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along the length of the coupling zone to stimulate a larger flame, and by varying the brush width during the elongation, the profile shape and thus the polarization and wavelength properties are modified as desired.

Subd 3

14. Method according to any one of claims 1 to 13, wherein the two single-mode fibers are identical.

15. Method according to any one of claims 1 to 13, wherein the two single-mode fibers are dissimilar.

16. Method according to anyone of claims 1 to 15, wherein more than two fibers are used to produce multiple wavelength couplers.

17. Method according to any one of claims 1 to 16, wherein the obtained coupler is secured to a suitable substrate and packaged.

18. Method according to claim 1, wherein the fusing and elongation are controlled by a computer program providing a repeatable recipe for these operations.

Subd 4

19. A multiplexing or demultiplexing single mode fiber optic coupler having a narrow channel spacing of a minimum of 0.4 nm, produced in accordance with any one of claims 1 to 16.